Rosemount TankMaster
Redundancy System
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Section 1  Getting Started

1.1 WHAT IS TANKMASTER REDUNDANCY?

A measurement system that requires high availability is preferably designed as a redundant system. This means that vital parts of the system exist in pairs to store the same data continuously. If either part is out of service or needs maintenance, the other part can take over without losing work effectivity or important data.

*TankMaster* is an Emerson Process Management/Rosemount Tank Gauging inventory management software package for installation and configuration of level gauging equipment. *Redundancy* is an add-on application that applies on the Tank Server. Redundancy can also be performed at the Field Communication Unit (FCU) level, see Rosemount TankRadar REX Service Manual.

*TankMaster* provides you with powerful and easy-to-use tools for installation and configuration of level gauging devices such as radar transmitter gauges (RTGs). The settings for protocols, devices and tanks can be changed in real time.

The graphical interface gives you a clear overview of installed devices and tanks. For each tank you can easily see the associated transmitters in the WinSetup application.

**Key Features**

- Monitoring of measured data
- Clear overview of installed tanks and devices (using WinSetup)
- Simple installation using wizards (using WinSetup)
- Open connectivity
- Object-oriented, user-friendly Graphical User Interface (GUI)

*TankMaster* is designed to be used in a Microsoft® Windows environment, providing easy access to measurement data from any PC in your network. Measurements and data are presented in realtime and you can customize views to suit your needs.

*TankMaster* supports the communication protocols Modbus, Enraf GPU, and OPC DA. As *TankMaster* is based on the open OPC standard, this allows you to import data into other systems, such as DCSs, PLCs, Scada systems and Microsoft Office programs.
1.2 TANKMASTER SOFTWARE PACKAGE

The TankMaster software package comprises the following software modules:
- **WinOpi or WinView**
- **WinSetup**
- **Tank Server**
- **Master Protocol server**
- **Slave Protocol Server**

**WinOpi**

*WinOpi* is the complete operator interface to the tank gauging system. It communicates with the *Tank Server* and various protocol servers to let the user monitor measured tank data. *WinOpi* also provides:
- alarm handling
- automatic report distribution
- historical data sampling
- inventory calculations for volume, density, mass and other parameters.

**WinView**

*WinView* is the operator interface with basic inventory capabilities for the tank gauging system. It communicates with the *Tank Server* and the different protocol servers to let the user monitor measured tank data. *WinView* also provides alarm handling, and automatic report handling.

**WinSetup**

The *WinSetup* program is a graphical user interface (GUI) for installation, configuration and maintenance of level gauging devices.
Tank Server

The *Tank Server* communicates with devices via the *Master Protocol Server* and handles configuration data for all installed tanks and devices. Parameters stored by the Tank Server include, for example:

- device names
- configuration data, such as tank type, antenna type, etc
- number of connected temperature sensors
- number of connected analog inputs

The *Tank Server* collects data from connected devices and distributes this information to the *WinOpi* and *WinSetup* user interfaces.

Master Protocol Server

The *Master Protocol Server* transfers configuration data and measured data between the *Tank Server* and connected devices in the tank gauging system. The *Master Protocol Server* is able to communicate with various types of devices such as FCUs, the Rosemount 2410 Tank Hub, and the Rosemount 5900S Radar Level Gauge to collect measurements for, for example, level, temperature and pressure.

Slave Protocol

The *Slave Protocol Server* is used to connect the *TankMaster* system to a host computer (DCS system). The *Slave Protocol Server* exchanges tank data between the *Tank Server* and the host computer via serial link, Modbus RTU.

OPC Server with Browser

*TankMaster* uses OPC Data Access 2.0 (OLE for Process Control), an open industry standard, which eliminates the need for costly customized software integration.

With the OPC server and the browser it is easy to import all custody transfer and inventory data to other OPC clients such as different DCS:s, PLC:s, Scada systems, or Microsoft Office® programs.

See the web site for the OPC Foundation for more information: www.opcfoundation.org

Customized Views

You can customize specific views and windows in *TankMaster*. Existing objects can be modified, or new ones created. You could, for example, create a window with an embedded image of your own plant to give a realistic overview, and configure the window so that when you click on a specific tank in the image, you can access the corresponding data for that tank.
1.3 INSTALLING THE TANKMASTER SOFTWARE

The following minimum system requirements must be met in order to run TankMaster version 6.B2 or higher:\(^{(1)}\):

### 1.3.1 Software

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 7 Professional (32 and 64 bit) SP1</td>
<td>English</td>
</tr>
<tr>
<td>Windows 2008 Server Standard (32 and 64 bit) SP2</td>
<td></td>
</tr>
<tr>
<td>Windows Server 2008 R2 SP1</td>
<td></td>
</tr>
</tbody>
</table>

### 1.3.2 Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>DELL recommended.</td>
</tr>
<tr>
<td>Processor</td>
<td>• 2.5 GHz (multi core processor) for Windows 7 and Windows Server 2008</td>
</tr>
<tr>
<td>Hard Disk</td>
<td>40 GB of available space.</td>
</tr>
<tr>
<td></td>
<td>• TankMaster + SQL Server 2005 Express needs approximately 600 MB</td>
</tr>
<tr>
<td></td>
<td>• Windows 7 and Windows Server 2008 needs at least 15 GB of available space</td>
</tr>
<tr>
<td>RAM</td>
<td>For Windows 7: 4 GB</td>
</tr>
<tr>
<td></td>
<td>For Windows 2008 Server Std / Server 2008 R2: 4 GB</td>
</tr>
<tr>
<td>Serial Ports</td>
<td>Two RS-232 serial ports are required, one serial for each protocol channel.</td>
</tr>
<tr>
<td></td>
<td>(USB can be used if no RS-232 exists)</td>
</tr>
<tr>
<td>USB</td>
<td>One USB port for each TankMaster hardware key.</td>
</tr>
<tr>
<td>Monitor</td>
<td>22 inch or larger recommended.</td>
</tr>
<tr>
<td>Graphics Card</td>
<td>1152*864, 65536 colors.</td>
</tr>
<tr>
<td>Hardware Key</td>
<td>One key for each TankMaster server PC. Connected TankMaster view nodes do not</td>
</tr>
<tr>
<td></td>
<td>require a hardware key.</td>
</tr>
<tr>
<td>Field Bus Modem:</td>
<td>(USB) Part no. 9240002-635</td>
</tr>
</tbody>
</table>

(1) For previous TankMaster versions other system requirements apply. Please contact Emerson Process Management/Rosemount Tank Gauging for more information.
1.3.3 Installation Procedure

To install the TankMaster software package:

1. Insert the TankMaster CD-ROM.

**NOTE!**
If the installation wizard does not start automatically when the CD-ROM is inserted, double-click the file TMSsetup.exe on the TankMaster CD-ROM.

2. To Install Acrobat Reader in order to read the TankMaster manuals in pdf format, click the Acrobat Reader button and follow the on-screen instructions.

3. To open the TankMaster WinOpi or WinSetup reference manuals, click the Manuals button, select a manual and click the View button.

4. To proceed with the TankMaster installation click the Install button on the splash screen, and follow the on-screen instructions of the wizard until the installation is finished.
5. The installation CD contains a number of installation options:

- **Demo**
  - *TankMaster* in demo mode with demo database.

- **Client**
  - Client installation only will be installed.
  - Suitable for network clients connected to a common Tank Server, or in systems with redundant servers.

- **Server and Client**
  - Suitable for standalone systems, and for network servers.

- **Redundant server**
  - Server installation including redundant Tank Server setup.

Choose **Redundant Server Installation** on the Setup Type screen to configure a server in a redundancy system. Clear the check box **Install Batch Server**, if a Batch server is not needed in the system.

6. Remember to **check the box** on the **TankServer Redundancy Configuration screen**, if the current server is intended to be the **Primary server** for the system redundancy.

Browse the network to **choose the Backup server** and get the **exact** computer name entered in the Buddy server field.
7. When installing the Redundancy program in the **Backup server**, leave the box unchecked, but remember to browse the network, or manually enter the exact name of the **Primary server** in the Buddy server field.

8. To configure a **Client**, select Client Installation on the **Setup Type** screen.
9. The **Installation Shield Wizard** will suggest necessary changes in the PC Setup. If, for example, the **DCOM settings** need changes, the following screen pops up:

![DCOM Settings Screen]

10. Check the current program settings before start copying the program files.

![Copying Files Screen]
11. When the InstallShield Wizard Complete screen turns up, **restart** the computer to start the TankMaster program.

![InstallShield Wizard Complete](image)

**Ini Files**

Tankmaster ini-files are required to read holding and input register data from field devices. These devices are available in WinSetup once installed.

If WinSetup indicates that the ini-files were not successfully installed, and they need to be re-installed, or updated, they can be installed separately without reinstalling TankMaster.

Simply repeat step 1 of the Installation Procedure and click the Inifiles button.
1.4 SERVER HARDWARE KEY

The Server Hardware Key Info window displays the functions enabled by the TankMaster hardware key. The information displayed is only valid for the selected server and cannot be altered. Also shown is the number of tanks that can be installed according to the TankMaster license, and the current number of installed tanks.

To access the Server Hardware Key Info window:

1. Go to the Tools menu and select View Server HW Key Info.
2. Select a server.
3. To close the Server Hardware Key Info window, click Close.

1.4.1 System Type

The System Type indicates in which mode TankMaster is running.

Inventory System

TankMaster runs as a complete custody transfer and inventory software package. All calculations are based on current API and ISO standards.

WinView System

WinView basic inventory capabilities suitable for smaller plants and terminals.

Demo System

TankMaster is running with full functionality and all values are simulated without any communication to the field devices.
1.4.2 Supported Functions

The Supported Functions pane in the Server Hardware Key Info window shows available TankMaster options. Selected options indicate that the corresponding function is enabled with the current hardware key. The table below gives an overview of the available functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Access to server via OPC and serial</td>
<td>Enables OPC and Modbus communications between TankMaster and SCADA/DCS</td>
</tr>
<tr>
<td>Redundancy</td>
<td>Enables the use of redundant servers</td>
</tr>
<tr>
<td>Network access for TM client nodes</td>
<td>Enables a TankMaster client to connect to the network and read tank and device data.</td>
</tr>
<tr>
<td>Extended Batch Function(\text{\textsuperscript{a}})</td>
<td>Creates MS Access files. Stores closed batches for up to 365 days. Delivery tickets can be recalculated. Tank Transfer Calculator enabled.</td>
</tr>
<tr>
<td>Custody Transfer System</td>
<td>Setup mode for the Custody Transfer System.</td>
</tr>
<tr>
<td>Custody Transfer Seal</td>
<td>Write-protected mode. No possibility to change configuration.</td>
</tr>
<tr>
<td>HTG calculation and Setup</td>
<td>Hydrostatic Tank Gauging, Enables level and inventory data from pressure.</td>
</tr>
<tr>
<td>Window Customizing</td>
<td>Enables the creation of customized windows.</td>
</tr>
<tr>
<td>Service Key</td>
<td>Personal key for service engineers.</td>
</tr>
<tr>
<td>Roof Tilt Alarm and Setup (Future function)</td>
<td></td>
</tr>
</tbody>
</table>

\textit{\textsuperscript{a}} For more information and instructions on Batch Handling, please refer to the TankMaster Batch Handling User Guide.

1.4.3 Tanks

The Tanks pane shows the number of licensed tanks and the number of installed tanks.

If the number of installed tanks exceeds the number of licensed tanks, the inventory calculation option is disabled until a hardware key with a sufficient number of licensed tanks is installed, or until tanks are uninstalled and the number of installed tanks is equal to or less than the number of licensed tanks.

1.4.4 TM Network Client Nodes

The TM Network Client Nodes pane shows the number of licensed nodes and the number of connected nodes for the selected server. The number of connected nodes cannot exceed the number of licensed nodes.

If the number of connected nodes is the same as the number of licensed nodes, no more nodes will be able to connect unless currently connected nodes are first disconnected, or until a new license key with an increased number of licensed nodes is installed.
### Illegal characters

The following characters should not be used when naming objects in *TankMaster* as this may cause undesirable results:

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/</td>
<td>Slash (Solidus)</td>
</tr>
<tr>
<td>\</td>
<td>Back-slash (Reverse solidus)</td>
</tr>
<tr>
<td>?</td>
<td>Question mark</td>
</tr>
<tr>
<td>*</td>
<td>Asterisk</td>
</tr>
<tr>
<td>[</td>
<td>Left square bracket</td>
</tr>
<tr>
<td>]</td>
<td>Right square bracket</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>Percent symbol</td>
</tr>
<tr>
<td>&lt;</td>
<td>Less-than symbol</td>
</tr>
<tr>
<td>&gt;</td>
<td>Greater-than symbol</td>
</tr>
<tr>
<td>{</td>
<td>Left curly bracket</td>
</tr>
<tr>
<td>}</td>
<td>Right curly bracket</td>
</tr>
<tr>
<td>'</td>
<td>Apostrophe</td>
</tr>
<tr>
<td>&quot;</td>
<td>Quotation mark</td>
</tr>
</tbody>
</table>
Section 2  System Overview

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2.2 Backup Operation ............................... page 2-4
2.3 Service Operation ............................... page 2-6

A complete TankMaster Redundancy system consists of two Tank Servers (a Primary Tank Server and a Backup Tank Server) and a number of Clients for the operators, see Figure 2-1 on page 2-2.

The Clients are equipped with the graphical user interface WinOpi.

The Tank Server communicates with connected devices and handles configuration data for all installed tanks and devices. Configuration data and many other parameters are stored by the Tank Server. The Tank Server polls data from connected devices and provide these data to the WinOpi/WinSetup user interface.

In a TankMaster Redundancy system, the two Tank Servers work as “hot redundancy”, that is tank server data, such as tank information and alarm limits, is replicated from the Primary Tank Server to the Backup Tank Server whenever there is a change. Measured values, such as tank level and product temperature, are polled by the respective Tank Server from the Field Communication Units (FCUs), see Figure 2-2 on page 2-3.

In case the Primary Server fails, the Backup Server automatically takes over and works as a Primary Server, see Figure 2-3 on page 2-4. After restart, the Primary Server is automatically updated with data from the Backup Server.
Figure 2-1. Redundancy system structure
2.1 NORMAL OPERATION

During normal operation, see Figure 2-2, the Tank Servers poll ordinary process data from the FCUs. The Primary Server replicates configuration data to the Backup Server.

The Client workstations, which are used by the operators, are connected through a Local Area Network (LAN) both to the Primary Server and to the Backup Server.

At a failure, the active connection is transferred to the Backup Server, which will then take over the role as the Primary Tank Server, see Figure 2-3.
2.2 BACKUP OPERATION

After a **Failover** is performed (see “Failover” on page 2-5), the Backup Server acts as the Primary server. It maintains the network connections to the WinOpi clients and polls level data from the FCUs.

Figure 2-3. Backup operation

When the Primary Server has recovered and is online again, it is updated with all data stored in the Backup Server database.
The following happens when a failure occurs and the Primary Server fails:

1. A message is sent to all clients running WinOpi, that the Primary Server is offline and the Backup Server is the new primary Tank Server.
2. The Primary Server icon changes and is equipped with a yellow exclamation mark to indicate a failure.

Figure 2-4. Icon in WinOpi

3. Automatic **Failover** to Server B is performed.

**Failover**

**Failover** is a script that is performed automatically when a failure on Server A is detected. It redirects network links from Server A to Server B.

Failover can also be performed manually, for example when a Tank Server needs service.

When Server A is restarted, it tries to establish the **Normal Operation** mode. If Normal Operation mode cannot be restored, a manual Failover must be performed.
2.3 SERVICE OPERATION

Service work is always performed on the server in backup mode. If service work is to be performed on the Primary Server, a manual *Failover* must be accomplished before the server can be shutdown, see “Service” on page 4-7.

Figure 2-5. Service operation

When the disconnected Tank Server is back online, the active Tank Server sends an update of collected data. After service, the system is restored to normal operation, see “Normal Operation” on page 2-3.
# Section 3 Installation

<table>
<thead>
<tr>
<th>3.1</th>
<th>Windows Configuration</th>
<th>page 3-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>Time Server Installation</td>
<td>page 3-15</td>
</tr>
<tr>
<td>3.3</td>
<td>Client and WinOpi Installation</td>
<td>page 3-18</td>
</tr>
<tr>
<td>3.4</td>
<td>Redundant Network configuration</td>
<td>page 3-20</td>
</tr>
</tbody>
</table>

The installation is divided into four parts:

- The first part includes general Windows settings, such as network installation and configuration, firewall configuration, and also to verify the TankMaster installation.
- The second part includes the Windows time server configuration.
- The third part includes the Windows time client and WinOpi configuration.
- The fourth and final chapter contains what is required for a redundant network and how it is configured.
In this chapter, the following network topology will be used for the TankMaster Redundancy system.

Figure 3-6. Network topology

The IP addresses used in Figure 3-1 is an example and may vary.

NOTE!
Basic knowledge about Local Area Network (LAN) is required for installation of the TankMaster Redundancy System.

NOTE!
In the following description the Primary Server is referred to as Server A and the Backup Server as Server B.
3.1  WINDOWS
CONFIGURATION

This chapter applies to both the servers and the clients.

1. Windows network configuration, see Windows network configuration on page 3-3.
2. Configure regional and language settings, see Configure regional and language settings on page 3-5.
3. Installation and configuration of the network cards, see Redundant network cards on page 3-6.
4. TankMaster installation, see TankMaster installation on page 3-10.
5. Windows firewall configuration, see Configuring the Windows Firewall on page 3-10.
6. Folder access, see Access permission on shared folder TM on page 3-13.

3.1.1  Windows network configuration

Before installing TankMaster, it must be decided if a domain or a workgroup should be used.

A workgroup is the simplest alternative and does not require a separate logon server, but the same Windows user name and password must be used on all connected computers. This because the matching of the user is done locally in the server. If different user names are used, WinOpi produces an Access denied error message at connection time.

On a domain, different Windows user names can be used as long as they are members of the same domain. A domain requires a separate domain server.

Workgroup

When installing TankMaster in a workgroup, perform the following steps:

- Create a Windows user name with administrator rights on all servers and clients.
  
  User name: TMSSystem
  
  Password: TankMaster

- Configure all servers and clients to auto logon on Windows with the newly created user name TMSSystem, see Configure auto logon in a Workgroup on page 3-4

- Restart and verify that the automatic logon works.
Configure auto logon in a Workgroup

It is recommended to use the auto logon feature on all servers and dedicated WinOpi clients.

1. Press the **Windows logo key + r** to access the **Run** command. Type **control userpasswords2** in the **Open** field, click **OK**.

2. Clear the check box **Users must enter a user name and password to use this computer** and click **Apply**.

3. When the **Apply** button is pressed, the **Automatically Log On** window will appear. Enter **TMSystem** in the **User name** field and **TankMaster** in the **Password** field. Confirm the password. Click the **OK** button.
Domain

NOTE!
It is recommended that the same Windows user name is used on all TankMaster Servers and dedicated WinOpi clients.

When installing TankMaster in a domain, perform the following steps:

- Create a Windows user name with administrator rights on the domain server. The user shall have Administrators right on the local computer.
  User name: TMSystem
  Password: TankMaster
- Configure all servers and clients to auto logon on Windows with the newly created user name TMSystem, see Configure auto logon for a Domain on page 3-5
- Restart and verify that the automatic logon works.

Configure auto logon for a Domain

If more than one domain servers are present, it is important that the TankMaster servers and the WinOpi clients are connected to the same domain.

All TankMaster servers should enable auto logon to Windows at startup. It is also recommended that all dedicated WinOpi clients have auto logon enabled as well, this since reports and alarms are created on the clients. To enable the auto logon feature in a domain, create a file in Notepad and save it as AutoLogon.reg. Enter the following in the file:

```regedit4
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\WIndows NT\CurrentVersion\Winlogon]
"DefaultUserName"="WINDOWS_DOMAIN_USER_NAME"
"DefaultPassword"="WINDOWS_DOMAIN_PASSWORD"
"AutoAdminLogon"="1"
```

Change the WINDOWS_DOMAIN_USER_NAME and WINDOWS_DOMAIN_PASSWORD to the newly created user name and password. Save and run the AutoLogon.reg file.

3.1.2 Configure regional and language settings

From the Control Panel, click Region and Language.

- Verify that all the computers use the same location.
3.1.3 Redundant network cards

NOTE!
Follow this section only when redundant network cards are to be used.

For a redundant network, a technique called smart load balancing is used on the network cards. This solution allows the use of two network cards sharing a single IP address. If either of the network cards or cables malfunction, the other one will take over with minimal time delay. The software required for this operation is Broadcom Advanced Control Suit 2 (BACS) and Broadcom Advanced Server Program (BASP). The latter allows several network cards to work in a team to be seen by the operating system as a single virtual network adaptor.

Required hardware
BASP requires that the network adapters are based on the BCM57xx chip.

Hardware installation
Install two network cards in every computer used for the TankMaster setup.

Install Drivers for network adapters
The operating system should find and install appropriate driver for the network cards. If not, use the supplied CD from the manufacturer.

Install BACS
Insert the Broadcom NetXtreme Gigabit Ethernet Driver Software Release CD.

Click Management Applications, read through the license agreement and accept.

Click Next and Finish to complete the installation.
Configuring BACS
Start BACS from the Control Panel. Click **Tools** and **Create Team** to configure a team. Use the following configuration parameters:

- Team name: **LanTeam**
- Add two network adapters to the team. Only the adapters based on Broadcom 57xx chip may be added.

**NOTE!**
Enable LiveLink. Use the following probe targets and member IP addresses.

<table>
<thead>
<tr>
<th>Probe Targets</th>
<th>Member IP Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server A</td>
<td>192.168.10.3, 192.168.10.51, 192.168.10.52</td>
</tr>
<tr>
<td>Server B</td>
<td>192.168.100.2, 192.168.100.51, 192.168.100.52</td>
</tr>
<tr>
<td>Operator Station 1</td>
<td>192.168.10.2, 192.168.10.3, 192.168.10.51</td>
</tr>
</tbody>
</table>

The Probe Targets are the IP numbers the BASP uses to verify the connection of the network. If BASP does not receive replies from any of the specified Probe Targets, BASP assumes that the network is down.

The Member IP addresses are used internally by BASP, they are not seen anywhere else.
Configuring IP number for virtual adapter

When the configuration of BACS is complete, a virtual adapter with the team name will appear in the Network Connections window.

To configure a static IP number to the virtual adapter, perform the following steps:

1. From the Control Panel open the Network and Sharing Center and choose Change adapter settings in the left pane.
2. Right click on the Local Area Connection and choose Properties.

4. Enable **Use the following IP address** and type the desired IP number and Subnet mask. The default gateway can be left blank.

Monitoring network connections using BACS

This is a screen shot of BACS during normal operation.

If a network card has lost the network connection the icon will change to
3.1.4 TankMaster installation

1. Attach a hardware key with the inventory, network and redundancy options enabled to the PCs.
2. Connect the server PCs, Server A and Server B, to the network switches and to the FCU/FCUs.
3. Install Rosemount TankMaster on both PCs, Server A and Server B, see chapter 1.3 (and TankMaster WinSetup User’s Guide).

At installation, the folder Rosemount is created in the root directory, and within this folder the TankMaster program folder is placed:
C:\Rosemount\TankMaster

3.1.5 Configuring the Windows Firewall

1. Open Windows Firewall from the Control panel.
2. Select Allow a program through Windows Firewall in the left pane.
3. Click on Change settings.

4. Click on Allow another program... to enable communication for needed system and program files. The window Add a Program turns up. Use the Browse button to locate the files to add. Start with adding needed Windows system files from the Windows System32 folder, and continue with the TankMaster files from the Rosemount folder.
5. Press the **Browse** button. Locate the file C:|Windows|System32|OPCENUM.EXE and press the **Open** button.

6. In the **Add a Program** window, mark the file to be added and press **Add**.
7. The added file is now allowed through the Firewall and checked on the list in the *Allowed Programs* window.

8. Repeat step 4—7 for the following files.
   - C:\Windows\System32\mmc.exe
   - C:\Rosemount\TankMaster\Server\TankServer.exe
   - C:\Rosemount\TankMaster\Server\BatchServer.exe
   - C:\Rosemount\TankMaster\Server\ModbusMaster.exe
   - C:\Rosemount\TankMaster\Server\IOTMaster.exe
   - C:\Rosemount\TankMaster\Server\enrafgpuMaster.exe
   - C:\Rosemount\TankMaster\Server\ModbusSlave.exe
   - C:\Rosemount\TankMaster\Server\DataHighwaySlave.exe
   - C:\Rosemount\TankMaster\Server\AsciiLTSlave.exe
   - C:\Rosemount\TankMaster\Opi\StmOpi.exe
   - C:\Rosemount\TankMaster\Setup\StmSetup.exe

9. Click the **OK** button to close the *Firewall* window.

10. Make the same **Firewall** configuration changes in the Backup Server and in all Clients, to allow communication between the Servers and the Clients in the *TankMaster* network.
3.1.6 Access permission on shared folder TM

Depending on if the computer is connected to a domain or a workgroup, the procedure to grant access to folders is different.

To verify the access permission on the TankMaster folder, browse via Windows Explorer to C:\Rosemount\ and right click on the TankMaster folder. Choose Properties and then the menus Sharing and Security from the popup menu.

Click on Advanced sharing... and set the name of the shared folder in the Advanced Sharing window.

Click on Permissions to access the window where to grant access for users.
Workgroup
Add groups or user names and set up their permissions in the window Permissions for TM

![Permissions for TM](image)

Domain
Verify that the group Everyone has the check box Full Control enabled.

![Permissions for TM](image)

NOTE!
Since Everyone includes all authenticated users, it is often desirable to give these permissions to a smaller subset of users. A way to accomplish this is to add all TankMaster users to a group, and give just this group Fully Control to the shared folder TM.
3.2 TIME SERVER INSTALLATION

It is recommended to configure all nodes to synchronize the system time with the same source.

Define one node to be the *TankMaster* time server (for example, the Primary Server in a redundant system). All other TM nodes, including Server-B, must synchronize the computer system time with the time server.

On the time server, a firewall port must be opened for the clients to be able to receive the current time. Perform the following:

1. From the **Control Panel**, on the time server, click the **Windows Firewall** icon.
2. In the left pane, click **Advanced security**.
3. The **Windows Firewall with Advanced Security** dialog box is shown. In the left pane, click **Inbound Rules**.
4. Then, in the right pane, click **New Rule**.
5. Follow the instructions in the **New Inbound Rule Wizard** to configure a port for time synchronization through the firewall.
6. Set Rule Type to **Port**, and press *Next*.

7. Choose **UDP** protocol, and specify the **Port** number (123). Press *Next*.

8. **Allow** the connection, and press *Next*. 
9. Specify in the **Profile** in which domain the computer works. Press **Next**.

![Profile Selection](image1.png)

10. Enter the name of the Rule: **Timeserver** and, optionally, a description of it.

![Name Entry](image2.png)

11. Click **Finish** and close the **Firewall** configuration window.

The configuration files are located in the **Time Synchronization** directory on the **TankMaster** CD.

1. Run the TM_SetAsClockServer.reg
2. Run the TM_StartClockServer.bat
3. Restart the computer in order to apply settings.
3.3 CLIENT AND WINOPI INSTALLATION

1. Configure Time Synchronization Client.
2. Connect WinOpi to the Primary Server.

3.3.1 Configure Time Synchronization Client

1. Copy files \texttt{TM\_SetAsClockClient.reg} and \texttt{TM\_StartAndSyncClockClient.bat} from the TankMaster CD to the TankMaster directory (C:\Rosemount\TankMaster).
2. Open the \texttt{TM\_SetAsClockClient.reg} with Notepad.
3. Edit row "NtpServer"="TM\_MASTER\_CLOCK\_NODE,0x1". Change \texttt{TM\_MASTER\_CLOCK\_NODE} to the TankMaster time server node name. Example: "NtpServer"="SERVER-A,0x1"
4. Edit row "0"="TM\_MASTER\_CLOCK\_NODE". Change \texttt{TM\_MASTER\_CLOCK\_NODE} to the TankMaster time server node name. Example: "0"="SERVER-A"
5. Save the file.
6. Run the \texttt{TM\_SetAsClockClient.reg} by double clicking the file.
7. Run the \texttt{TM\_startAndSyncClockClient.bat} by double clicking the file.
8. Restart the computer in order to apply settings.

On all other TM client nodes, browse via the network to the first client node where the modified file is located and repeat point 6 and 7. This will enable the time client on the local computer.
### 3.3.2 Configure WinOpi Client

All WinOpi Clients must be connected to the Primary Server (Server-A). This is accomplished by performing the following steps:

1. Open the *WinOpi Workspace* on the Client. Select the **Plants** view.
2. Right-click on **Plants** and select **New connection**.
3. Click **Browse** and select the computer used as the Primary Server. Type the desired **Plant name** to appear in the WinOpi workspace. Enter the **Alias** name that will be used for the Primary Server in the WinOpi workspace, see WinOPI Tools/Options for more information. Click **OK** when done.
3.4 REDUNDANT NETWORK CONFIGURATION

Since the redundant configuration creates a loop between the two switches, see Figure 3-6 on page 3-2, a Spanning Tree Protocol (STP) must be used. The STP is designed for networks with multiple paths and prevents flooding of the network. There are three different versions of the STP:

- **STP (IEEE 802.1d, Spanning Tree Protocol).** This is an obsolete protocol. The convergence time is 30 to 50 seconds.
- **RSTP (IEEE 802.1w, Rapid [convergence] Spanning Tree Protocol).** The convergence time is 1 to 3 seconds.
- **MSTP (IEEE 802.1s Multiple Spanning Tree Protocol).** This is a further development of RSTP which supports Spanning Tree Protocol in Multiple Virtual Networks environment.

For minimal time delay if any switch fails the RSTP must be used.

For even quicker response times when a network failure is detected a technique called **Edge** is used. The edge port concept means that ports directly connected to end stations cannot create bridging loops in a network and can thus directly transition to forwarding, skipping the lengthy listening and learning stages. Edge ports that receive configuration messages immediately lose their edge port status and become normal spanning tree ports. A loop created on an improperly connected edge port is thus quickly repaired.
3.4.1 Switch

The following chapter describes how to configure RSTP and Edge for the HP ProCurve 2810 switch.

HP ProCurve 2810

NOTE!
All documents referred to in this chapter are enclosed with the HP ProCurve switch.

How to connect and assign IP address to the switch is described in Quick Installation Guide for the ProCurve Series 2810 Switches in the following chapters:

- Chapter Install the Switch, sub chapter Connect a Console to the Switch.
- Chapter Configuring the Switch.

Spanning Tree Configuration

As described in Advanced Traffic Guide for the ProCurve Series 2810 Switches, chapter Multiple Instance Spanning-Tree Operation, this configuration is only available using a CLI (Command Line Interface).

1. Start Internet Explorer. In the address field, enter the IP number of the HP ProCurve switch. In this example 192.168.10.51.
2. In the Configuration tab select telnet session to the switch console.
3. Enter the following:
   ```
   configure
   spanning-tree
   spanning-tree 1-20 edge-port
   ```
Section 4  Operation

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4.5 Service . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . page 4-7
4.6 Server status . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . page 4-8

4.1 ADMINISTRATOR PROGRAM

When the TankMaster Redundancy has been installed, the Administrator program is enhanced with several functions, for example an alive indication (each five seconds), the Failover functionality, and PRIMARY/BACKUP mode indication.

Failover is a script that is performed automatically when a failure on the Primary Server is detected. It redirects network links from the Primary Server to the Backup Server.

Failover can be performed manually, for example when a TankMaster server needs service. Failover is also used to restore from backup mode to normal mode. Click the Redundancy button to open the current status window. Then click the Failover button to perform a manual Failover.
4.1.1 TankMaster Redundancy

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank Server</td>
<td>The check box indicates that TankMaster Server is in operation.</td>
</tr>
<tr>
<td>[PRIMARY] / [BACKUP]</td>
<td>Indicates whether the TankMaster Server is in Primary mode or Backup mode.</td>
</tr>
<tr>
<td>Redundancy button</td>
<td>Opens the Redundancy window. Ability to perform a Failover and correct a database synchronization problem.</td>
</tr>
<tr>
<td>Status button</td>
<td>Opens the Server Status window with general information about TankMaster and server status.</td>
</tr>
</tbody>
</table>

4.1.2 The control buttons

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processes</td>
<td>View all running TankMaster processes.</td>
</tr>
<tr>
<td>Stop TM</td>
<td>Stop the TankMaster system.</td>
</tr>
<tr>
<td>Restart TM</td>
<td>Restart the TankMaster system.</td>
</tr>
<tr>
<td>Backup/Restore</td>
<td>Open the Backup configuration window.</td>
</tr>
<tr>
<td>Log on</td>
<td>Log on to the Administrator Program.</td>
</tr>
<tr>
<td>Log off</td>
<td>Log off from the Administrator Program.</td>
</tr>
<tr>
<td>Close</td>
<td>Close the window.</td>
</tr>
<tr>
<td>More Options &gt;&gt;</td>
<td>View more Options.</td>
</tr>
<tr>
<td>Auto Start Config...</td>
<td>Open the Auto Start Configuration window.</td>
</tr>
<tr>
<td>Fail Over Servers</td>
<td>Switch over all enabled servers in a sequence to the Backup server.</td>
</tr>
<tr>
<td>File Details...</td>
<td>View all files installed under TankMaster.</td>
</tr>
<tr>
<td>Process Affinity...</td>
<td>Open the Process Affinity window.</td>
</tr>
<tr>
<td>Change Password...</td>
<td>Open the PW change window.</td>
</tr>
<tr>
<td>Debug Report...</td>
<td>Possibility to create mini dumps for some processes.</td>
</tr>
</tbody>
</table>

NOTE!
The Administrator program on the Backup Server does not know the current status of the Primary Server, only that the Primary Server is running.
4.1.3 Redundancy window

Click the Redundancy button and log in as Administrator to the TankMaster Administrator program to see which server is in charge. The Redundancy window shows the following when the Primary Server is in charge:

On the Backup Server, the Redundancy window shows the following:

From the Redundancy window it is possible to manually initiate a Failover from the current server (SERVER-A) to the redundant server (SERVER-B), by clicking the Failover button (turns active when the cursor moves over it).

When the Failover is performed, the message "Command completed successfully!" is shown on both the Primary Server and the Backup Server, and information in the Redundancy window has changed. SERVER-A shows:
4.2 WINOPI

4.2.1 Redundancy

When a server is running in redundant mode the icon changes to a “double-computer” icon, see below. Local Server (SERVER-A) is the Primary Server with SERVER-B as the redundant Backup Server.

4.2.2 Messages and alerts

Whenever there is a status change of the redundant servers, a message is sent to all WinOpi clients.

To alert the operator there has been a failure, there is also an error message presented at the bottom of the WinOpi client window.

Also the “double-computer” icon shows an alert to indicate that the Backup server has taken over from SERVER-A.
4.3 GENERAL FAILURES

The Primary Server may become unavailable for various reasons, such as:

- Power failure
- Hardware failure
- System hanging
- Other system failures resulting in a non-responding system or network disruption

When the Primary Server fails, the Backup Server will take over within 30 seconds.

During **Failover** the operator may experience a short delay before the Client has connected to the Backup Server.

Once a server (Primary or Backup) is unavailable, a message will appear in the status bar of the WinOpi, informing the operator which server has failed.

It is important that a failed server is restored as soon as possible, to quickly resume the redundancy functionality.
4.4 SERVER CASE SCENARIOS

4.4.1 Primary Server failed resulting in a Failover

Verify that the Backup Server is acting as Primary Server. Check the network connections to make sure they are connected properly. Reboot the former Primary Server (SERVER-A).

When SERVER-A starts, it should enter Backup mode. Verify that no database synchronization problem exists, see “Database synchronization problems” on page 4-7, and perform a manual Failover.

4.4.2 Backup Server has failed but Primary Server is still running

Check all network connections to make sure that they are connected properly. If two primary servers are present, see “Server failure resulting in two Primary Servers” on page 4-6. Reboot SERVER-B and wait until it is reloaded.

Verify in the TankMaster Administrator program that everything is loaded and the status of SERVER-B is BACKUP. Also check the TankMaster Administrator program Event log that no errors are present.

On Server A: In the TankMaster Administrator program, click the Redundancy button. The status of both Primary Server and Backup Server should be OK, see “Redundancy window” on page 4-3.

Verify that no synchronization problems are present in the TankMaster Administrator program Event log. If synchronization problems are present, see “Database synchronization problems” on page 4-7.

4.4.3 Server failure resulting in two Primary Servers

In case of network problems to the Primary Server (SERVER-A), the Backup Server will take over resulting in two primary servers. If this occurs it is important to restore network connections to both servers.

When both servers are running as Primary Servers, database synchronization error may occur.

To verify no database synchronization problem exits, click the Redundancy button in the TankMaster Administrator program.

In the Database synchronization group box, the status of the database is presented. If database synchronization problems are present, see “Database synchronization problems” on page 4-7.
4.4.4 Database synchronization problems

From the *TankMaster Administrator program* click the **Redundancy** button. If there is a synchronization problem, the registry flags must be cleared.

This is accomplished by clicking the **Clear flags** button. The flags should be cleared on both servers. When all flags are cleared, the Backup Server (SERVER-B) must be restarted. Make sure that SERVER-B enters backup mode and verify that no errors are present in the *TankMaster Administrator program* Event log.

4.5 SERVICE

When performing service work on either server, do the following:

1. Make sure that the server to be shutdown is running in backup mode. If not, do a manual **Failover**, see “Administrator program” on page 4-1.
2. Shutdown the server running in backup mode.
3. Perform service work on the server.
4. Start up the server.
5. Check that the server starts in backup mode, see “Administrator program” on page 4-1

**NOTE!**

If both servers need service simultaneously, always shutdown the Backup Server first to avoid synchronization problems. After service, always begin startup with the server that was the Primary Server before shutdown.
4.6 SERVER STATUS

During operation several messages are presented to the user. Examples of messages are primary failure, backup server status (OK or failure) etc. These are logged in the OPC Server Information (Status) log.

Right-Click the **Redundant Server icon** in the *TankMaster WinOpi program* and choose **Server Status** from the popup menu to view the *OPC Server Information* log.

The **OPC Server information** window shows the Status log of the servers:
Section 5  Redundancy checklist

5.1 Verify TankMaster Redundancy .......................... page 5-1
5.2 Verify Network Redundancy ............................. page 5-1

5.1 VERIFY TANKMASTER REDUNDANCY

The following chapter describes how to verify the TankMaster system is redundant.

1. Perform a manual failover (click the Failover button).
2. Verify from a WinOpi client that all tanks are present. If no tanks appear, perform a manual failover again and reboot SERVER-B (Backup Server).
3. When SERVER-B has restarted, perform a manual failover. If no tanks are visible despite the restart of the server, verify write access to the shared TM folder, see “Access permission on shared folder TM” on page 3-13.
4. When verified that all tanks successfully have been copied to SERVER-B, make a new manual failover to set the system in normal operation again. (SERVER-A active, SERVER-B backup.)

5.2 VERIFY NETWORK REDUNDANCY

To ensure that the redundancy of the network has been correctly configured, perform the following tests.

1. Verify that the primary adapters in BACS do not have any connection problems. If the adapters are marked with a red cross, connection problems exist, see “Monitoring network connections using BACS” on page 3-9.
2. Start TankMaster on all computers and verify network connectivity.
3. While TankMaster is running try the following:
   • Temporary power off the switches one by one.
   • Disconnect the redundant network cables one by one.
This should result in:
   • The status of the network adaptor in BACS changes accordingly.
   • TankMaster is not affected by these single points of failures.

NOTE!
Remember to make a 30 seconds pause after the system has recovered from a single point of failure and before trying a new one.
Section 6  Trouble Shooting

6.1  DCOM error messages ................................. page 6-1
6.2  Check Configuration of DCOM settings ........ page 6-2
6.3  WinOpi failures ................................. page 6-6
6.4  Other ............................................................ page 6-7

6.1  DCOM ERROR MESSAGES

If the problem is DCOM related, look in the Windows Event Viewer for error messages. Check the Event viewer for both the Clients and the Servers. The Event Viewer is located in the Control Panel in Administrative Tools.

6.1.1  Server not available

The message “Server not available” means that the remote computer is down. The connection timeout can be up to 140—150 seconds depending on the current network setup.

Example: In case WinOpi is started and one remote server is unavailable, there is a delay until the error message is presented. The delay is about 140—150 seconds.

6.1.2  Access is denied

The message “Access is denied” points to improper configuration of the DCOM settings.

The message will be presented with no time delay to the user.

6.1.3  Server execution failed

The message “Server execution failed” is presented in case no user is logged on.

The message will be presented with no time delay to the user.

6.1.4  System message about protocol servers ...

If the system message concerns protocol servers on remote stations, verify the DCOM configuration, see “Check Configuration of DCOM settings” on page 6-2.

6.1.5  The object exporter specified was not found

The message “The object exporter specified was not found” means that the computer has no IP address. This may show up as error code 0x80070776 returned from a failed connection.
6.1.6 The object is disconnected from its clients

DCOM clients ping the server object. In case these pings are undetected by the server, during approximately 6 minutes, the server disconnects from these clients. Normally, WinOpi Clients will detect this error and try to re-establish the connection to the server.

6.2 CHECK CONFIGURATION OF DCOM SETTINGS

Check the DCOM settings, made by the TankMaster Installation program.

1. Press the Windows logo key + r to access the Run command.
   Type dcomcnfg in the Open field, and click OK.

2. The Component Services window will appear. Double-click on the Component Services icon and then on the Computers folder icon.

3. Right-click on the icon My Computer and select Properties from the popup menu.

4. In the Default properties tab, verify that the Enable Distributed COM on this computer is selected.
5. In the **COM Security** tab, click the **Edit Limits** button in the **Access Permissions** group box.

![Image of COM Security tab](image1)

6. Check that the following groups exist in the field “Groups or user names”: **Everyone**; **System**; **Network**; **Administrators**; **Performance Log Users**, **Distributed COM Users**; **Interactive**; and **Anonymous Logon**.

![Image of Access Permission](image2)

7. Make sure that both Local Access and Remote Access are set to **Allow** for all the users in the **Group or user names** list. Click **OK** to close current window.
8. If any group is missing, press the Add button, and the Select Users or Groups window will appear. Add missing group(s), and click OK.

9. Click the Edit Default button in the Access Permission group box, and check that the following groups are listed: Everyone; Self; Network; System; Administrators; Interactive; and Anonymous Logon.

10. Verify both that Local Access and Remote Access are set to Allow for all users listed in the Group or user names list. Click OK to close current window.

11. Click the Edit Limits button in the Launch and Activation Permissions group box, and check that the following groups are listed: Everyone; System; Network; Administrators; Performance Log Users, Distributed COM Users; Interactive; and Anonymous Logon.

12. Make sure all check boxes in the Permissions for are set to Allow for all users in the Group or user names list. Click OK to close current window.

13. Click the Edit Default button in the Launch and Activation Permissions group box and check that the following groups are listed: Everyone; System; Network; Administrators; Interactive; and Anonymous Logon.

14. Make sure that all Allow check boxes for all users are checked. Click OK to close current window.

15. Close the My Computer Properties window using the OK button.

**NOTE!**

Since Everyone includes all authenticated users, it is often desirable to add these permissions to a smaller subset of users. A way to accomplish this is to create a group named TM Users and add all users names to this group that will execute any OPC Server or Client, for example user TMSystem. Then substitute TM Users everywhere that Everyone appears in the configuration dialogs described above. It is also possible to use a specific user, for example user TMSystem instead of the group Everyone.
Setting TankMaster permissions

1. Open the Component Service window (Step 1 in the previous section).
2. Double-click the Computer icon and then the icon My Computer. Expand the DCOM Config folder by double-clicking it.

3. Right-click on the OpcEnum icon, and select Properties from the popup menu.

4. Check the Security tab, that Launch and Activation Permissions and Access Permissions are set to Use Default.
5. Click the **Edit** button for the **Configuration Permissions** and verify that the **Administrators** Group is present in the list.
   If not, add the **Administrators** Group by clicking the **Add** button.
   Click **OK** to leave current window.

6. In the **Identity** tab, check that the **The interactive user** is selected.
   Click **OK** to close the window.

7. If necessary, use the **Component Services** window and repeat steps 3 - 6 to check set permissions in the following applications:
   • Rosemount\TankMaster\BatchServer OPC Server.
   • Rosemount\TankMaster\EnrafGPUaster OPC Server.
   • Rosemount\TankMaster\IOTMaster OPC Server.
   • Rosemount\TankMaster\ModbusMaster OPC Server.
   • Rosemount\TankMaster\TankServer OPC Server.
   • COM Server for configuration of TankMaster Ascii Slave protocol.
   • COM Server for configuration of TankMaster AsciiLT Slave Protocol.
   • COM Server for configuration of TankMaster DataHighway Plus Slave Protocol.
   • COM Server for configuration of TankMaster Modbus Slave Protocol.
   • COM Server for configuration of TankMaster ModbusLU Slave Protocol.

### 6.3 WINOPI FAILURES

#### 6.3.1 No tanks are displayed

If a **Failover** has occurred and no tanks are displayed in the tank view, WinOpi must be restarted manually. This behavior may happen if the system is heavily overloaded during the actual **Failover**.

#### 6.3.2 Redundancy restored but error message still present

If there has been a **Failover** and redundancy is restored but the Client still reports a problem, perform a manual restart of WinOpi.
6.4 OTHER

6.4.1 Unable to connect to shared folder TM

When trying to access the shared folder TM an access denied message is presented. Verify that the user TMSystem has logged in on all computers. If the problem still exists, try to un-share the TM folder and then re-share it again, see “Access permission on shared folder TM” on page 3-13.

6.4.2 Database copying problem

If the TankMaster Administrator Event log indicates an error when trying to copy the database to the Backup Server, there may be an access permission problem. For verification of the access permission, see “Access permission on shared folder TM” on page 3-13.

6.4.3 Firewall setup

If there are communication problems between the Servers or between any Server and a Client, check the configuration of Windows Firewall in the Control Panel, see “Configuring the Windows Firewall” on page 3-10.

6.4.4 Redundancy configuration not correct

If the redundancy between the Primary Server and the Backup Server do not function correctly, check the redundancy configuration in both servers.

NOTE!
Make sure that the Tank Server on Server B is shut down by checking the processes in the Administrator Program. Only the Administrator Program process should be running, see TankMaster WinSetup User’s Guide.

To configure Server A for redundancy do the following:

1. Open the WinOpi Workspace on Server A. Select the Plants view.
2. Right-click on the **Local Server** icon and select **Redundancy** on the popup menu to display the current redundancy state.

![Redundancy](image)

3. To change server, click the **Change** button and log in as Administrator.

![Logon to TankMaster](image)

4. Also check the **Connections** from the popup menu.
   As Administrator, it is possible to change, connect and disconnect Servers and Clients in the TankMaster configuration.
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